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Natural resources sector: Review and identification of opportunities for commodity-based trade and development

Note by the UNCTAD secretariat

Executive summary

Natural resources contributed positively to the economic development of countries such as the United Kingdom of Great Britain and Northern Ireland during the first Industrial Revolution in the eighteenth and nineteenth centuries. Natural resources also underscored the early stages of, and still contribute to, the development of countries such as the United States of America, Canada and the Netherlands. Australia and some middle-income developing counties such as Malaysia, Brazil, Argentina and Mexico are all recent examples of commodity-based development. In the cases of several developing and least developed countries, however, empirical assessments of the link between natural resources and development have yielded negative results, as natural resources have sometimes been associated with the so-called "Dutch disease", leading to the conclusion that natural resources are a curse, rather than a blessing, to a country.

This background paper reviews and identifies opportunities for commodity-based trade and development, with a focus on the natural resources sectors, including energy, minerals and metals, in accordance with the Accra Accord (paras. 91 and 98) and the Doha Mandate (para. 31(i)). The paper discusses a number of key issues relevant to these sectors, including the retention of resource rents and their use for broad-based development as well as for the integration of the often enclave sectors of natural resources in national development policies and strategies. It concludes with an examination of renewable energies, an emerging issue.

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Introduction

1. The contribution of natural resources to growth and sustainable development, particularly with regard to commodity-based trade, has been a recurring debate in development literature. This issue has become a priority for natural-resource-endowed countries in the context of the recent commodity boom, which most analysts agree is the deepest and the broadest to date, as it has affected all commodity groups to varying degrees. In particular, this is because several analyses of the impact of the commodity boom on exporting countries suggest that while most countries have registered unprecedented economic growth rates, it is doubtful whether these can be sustained in the medium to long term, as little or no revenues have been invested in productive capacities, which have remained weak.

2. This debate has been raging against the backdrop of the experiences of countries such the United Kingdom, in which natural resources are believed to have contributed positively to economic development in the eighteenth and nineteenth centuries, during the first Industrial Revolution. Indeed, natural resources underscored the early stages of the development of developed countries such the United States, Canada and the Netherlands. Australia and some middle-income developing counties such as Malaysia, Brazil, Argentina and Mexico are all recent examples of commodity-based development.

3. In the cases of several developing and least developed countries, however, empirical assessments of the link between natural resources and development have yielded negative results – meaning that natural resources do not really contribute to economic growth and development. Furthermore, natural resources have sometimes been associated with the Dutch disease, a cascade of imbalances resulting in inflation and an appreciation of the real exchange rate. This has led to conclusions that discoveries of natural resources are a curse to a country, and the paradox of plenty (Sachs and Warner, 1995, 2001; Gylfason, 2001; Brückner, 2010).

4. Are natural resources, and derived commodities, good or bad for economic growth and development? Under which circumstances can trade in natural resources make a positive contribution to development? What mechanisms allow commodities derived from natural resources to enhance trade, economic growth and development? What policy levers are available to natural-resource-rich countries to enhance the impact of commodity rents on their development efforts? This paper attempts to make a contribution to this debate, starting with the most common form of sharing in commodity rents: taxation regimes.

5. The objective of this paper is to review and identify opportunities for commodity-based trade and development, with a focus on the natural resources sectors, that is, energy, minerals and metals, in accordance with the Accra Accord (paras. 91 and 98) and the Doha Mandate (para. 31(i)). In the process of reviewing and identifying these opportunities, the paper discusses a number of key issues relevant to these sectors, including increasing the share of resource rents and their use for broad-based development as well as for the integration of the often enclave sectors of natural resources in broad-based national development policies and strategies that incorporate value addition and retention in local economies. The paper concludes by examining the emerging issue of renewable energies that has featured less in this discourse until recently, although these remain critical for sustainable growth and development in developing countries.

I. Review of existing opportunities

6. The literature is replete with a number of specific frameworks pertaining to the capture of resource rents and their use. Traditionally, countries have used various taxation regimes, including royalties and fees, as the vehicle for their share of natural resource rents. These are used to finance government expenditure programmes as indicated in their budget statements. Given the boom-and-bust cycles associated with commodities, however, most governments overspent during the boom years and have to struggle to meet fiscal deficits when commodities process fall. In response, some governments have implemented budgetary management measures to improve the allocation of resources and to smooth government expenditure over time by using stabilization funds and investment rules as part of an overall national revenue management process. Sovereign wealth funds, including future generation funds, have been increasingly used since the 1980s by governments to meet these objectives as well as to promote broad-based sustainable commodity development.

A. Commodity-based trade and taxation regimes

7. Trade in commodities derived from natural resources has the potential to generate substantial revenues to developing countries through various types of taxes. Crude oil, natural gas, metals and minerals are among the commodities that have proven to be the main sources of export revenues. For example, world export values of natural and manufactured gas increased from about $88 billion in 2002 to around $421 billion in 2012 (+ 380 per cent). Developing countries accounted for more than one third of the value in 2002 and almost half of the value in 2012. That is, the export value of gas in developing countries increased from $35 billion over the period, amounting to an increase of 500 per cent.[1] Therefore, if carefully and properly designed, taxation regimes could help developing countries reap the maximum of benefits from the aforementioned and other commodities.

8. Designing a good taxation regime is, however, a complex issue, considering the wide variety of available tax regimes, including rent-based and royalty-based ones. The rent-based system takes into account both costs and profits, while royalties are only charged on revenues. Whereas from the investors' perspective a tax regime based on profits is the first best because it guarantees that they will not be taxed when they record losses, the government will normally prefer a royalty-based regime because it ensures the collection of predictable revenues during the project life cycle (UNCTAD, 2005).

9. A recent study argued that theoretically a rent-based regime presents a number of economic opportunities, including its neutrality in investment and production decisions (Mintz and Chen, 2012). However, in practice, the efficiency of rent-based regimes is undermined by information asymmetries on the costs and revenues of exploiting firms, usually, transnational corporations (TNCs). Moreover, environmental, social and political costs are not always easily determined, making it difficult for the tax authorities to accurately compute the tax liabilities. For these reasons, many countries charge revenues without taking into account all or at least part of the costs incurred (Mintz and Chen, 2012). The royalty-based system is considered less costly in administrative terms. However, this system is also not without problems. As observed by UNCTAD (2005), mining firms may use a number of strategies to avoid being heavily taxed, including altering the annual rate of extraction where fixed royalties are concerned, or adjusting extraction levels in the case of ad valorem royalties.

[1] UNCTADstat.

10. Rent-based and royalty-based systems generally coexist with other types of taxes, for example, corporate taxes, value added taxes, export taxes and surface rentals. Tax regimes may also include incentives such as tax holidays or other exemptions. The recent boom in commodities in general, and in natural-resources-related commodities in particular, has prompted resource-rich countries to reform their taxation regimes, in order to share more equitably the benefits resulting from the boom. For example, in July 2012, Australia started taxing at 30 per cent iron ore and coal miners whose profits exceeded $A75 billion (InterrriaRMG Resource Sector Intelligence, 2013). There are indications that other countries such as the Dominican Republic and the United Republic of Tanzania have plans to revise their tax regimes in the natural resources sector as well.

11. The expected revisions of tax regimes underscore their role as a means of capturing resource rents in an equitable manner. However, the capture of resource rents depends on collective action both from the government of the host country and the private sector, including foreign investors, in natural resources. Therefore, the participation of the private sector in the process should not be neglected. That is why the Organization for Economic Cooperation and Development (OECD) has been working towards that objective by providing voluntary guidelines to TNCs. Regarding taxes, OECD stresses the importance of TNCs in contributing to the public finances of the host country in a timely manner. Moreover, these guidelines aim to encourage TNCs to abide by the rules and regulations of the countries where they operate (OECD, 2008).

12. Beyond the capture of resource rents, taxation regimes can be strong drivers of development. For example, the Chilean mining taxation regime was praised to be in support of economic development because it is clear, progressive and predictable (Korinek, 2013). Such clarity enables investors to assess their costs and make investment decisions accordingly. Its progressiveness provides a framework that makes it possible to include a range of mining firms from small to large ones, and therefore to increase the size of the tax liabilities. Further, predictability is a key element, since investment in natural resources is characterized by a long gestation period; therefore, a stable, or at least a predictable policy environment is critical (Dumas, 2012).

13. Additional options to capture resource rents include contractual schemes, such as production-sharing and State equity (Sunley and Baunsgaard, 2001). Sometimes instead of being an external partner of the exploiting companies, governments can directly participate in the operations of TNCs or national exploiting firms through State equity. According to the International Monetary Fund (IMF), this option has the advantage of providing ownership to governments and facilitating its oversight of the whole chain of activities, from exploration to extraction. Furthermore, it can serve as a powerful tool to ensure knowledge or technology transfers. However, as a stakeholder, the government will share losses when they occur. Research has also revealed that knowledge and technology transfers are not automatic, but are dependent on prevailing conditions, including skill levels, technological development, infrastructure and an enabling policy environment (UNCTAD, 2005).

14. Once captured, resource rents can serve the development needs of the host country. Whatever its features, however, it takes more than a tax regime to effect development. In addition to tax collection, a country needs a development strategy with clear priorities, and the allocation of collected tax and other resources should be done according to these priorities. The priorities must include supply-side interventions aiming at the alleviation of supply bottlenecks if strong inflationary pressures and other complex symptoms of the Dutch disease are to be avoided (UNCTAD, 2006a). The Dutch disease is not inevitable, although the large and immediate flow of resource rents into a country can create inflationary pressures and an appreciation of the real exchange rate that can lead to a misallocation of resources and therefore have detrimental effects on economic development. That is why

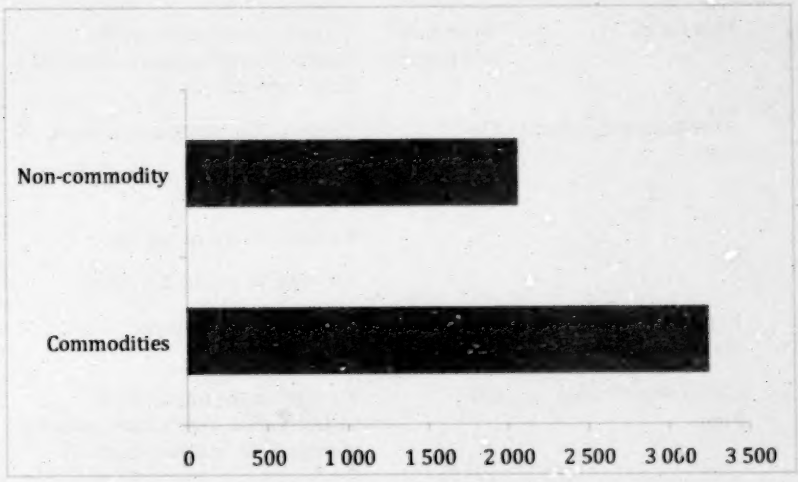
many countries have established budgetary management measures such as sovereign wealth funds to manage their natural resource revenues, as discussed in the following section.

B. Commodity-based trade and sovereign wealth and future generation funds

15. A sovereign wealth fund is "a State-owned investment fund or entity that is commonly established from balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, governmental transfer payments, fiscal surpluses and/or receipts resulting from resource exports".[2] The majority of such funds originate from official foreign currency operations derived from commodities such as oil, gas, minerals and metals (figure 1 and table 1). Their popularity across the world's continents over time is depicted in figures 2 and 3.

Figure 1
Assets of sovereign wealth funds by fund origin, as of 18 July 2013

(Billion dollars)



Source: http://www.swfinstitute.org/swfs/revenue-regulation-fund.

16. The diversity in stated purposes of sovereign wealth funds reflects the diversity of their contributions to development. Widely admitted objectives and contributions are macroeconomic stabilization and sterilization of financial inflows to avoid the Dutch disease. In addition, the high volatility experienced in the recent commodity boom has also shown the detrimental effects of commodity price volatility and the importance of insulating national economies and stabilizing export revenues for a more predictable contribution to national budget and productive investments in the host country.

[2] See http://www.swfinstitute.org/sovereign-wealth-fund.

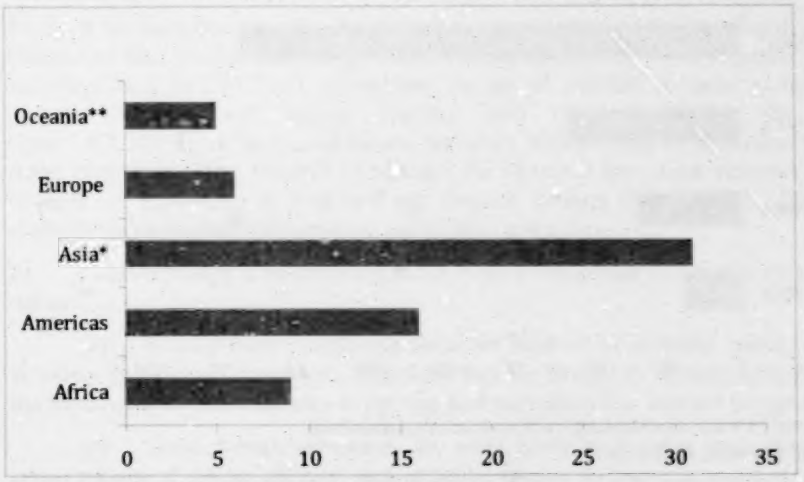
Table 1
Objectives of sovereign wealth funds in selected countries (as of 5 November 2013

Country	*Fund name*	*Origin*	*Stated purpose(s)*
Algeria	Fonds de Régulation des Recettes	Oil	To insulate the economy from price volatility in gas and oil commodities prices
Angola	Fundo Soberano de Angola	Oil	To diversify gradually the investment portfolio across a number of industries and asset classes in accordance with investment policy and guidelines
Australia	Western Australia Future Fund	Minerals	To invest in overseas investments in cash and bonds, not in equities
Azerbaijan	State Oil Fund of Azerbaijan	Oil	To manage foreign currencies and assets generated from oil and gas exploration and development
Botswana	Pula Fund	Diamonds and minerals	To preserve a portion of the income from diamond exports for future generations
Canada	Alberta Heritage Fund	Oil	To invest for future generations
			To strengthen and diversify the economy
			To improve quality of life
			To serve as a rainy day fund
Chile	Economic and Social Stabilization Fund	Copper	To smooth government expenditures
Ghana	Ghana Stabilization Fund	Oil	To cushion the impact of or sustain public expenditure capacity in periods of revenue shortfalls
Kazakhstan	Kazakhstan National Fund	Oil, gas and metals	To ensure that the economy will be stable against price swings of oil, gas and metals
Mauritania	National Fund for Hydrocarbon Reserves	Oil and gas	To accumulate savings for future generations
Mexico	Oil Revenues Stabilization Fund of Mexico	Oil	To allow automatic fiscal stabilizers to work in a context of a balanced budget rule

Country	*Fund name*	*Origin*	*Stated purpose(s)*
Mongolia	Fiscal Stability Fund	Mining	To promote fiscal stability, especially in the scenario of a global fall in non-oil commodity prices
Nigeria	Nigeria Sovereign Investment Authority[3]	Oil	To manage excess profits from the country's sale of crude oil
Norway	Norway Government Pension Fund Global[4]	Oil	To counter the effects of the forthcoming decline in income and smooth out the disrupting effects of highly fluctuating oil prices
Oman	Oman State General Reserve Fund	Oil and gas	To achieve long-term returns for the Government, to act as a stabilization fund for the Government and to provide liquidity to the Government when called upon
Qatar	Qatar Investment Authority	Oil	To strengthen the country's economy by diversifying into new asset classes and investments

Source: http://www.swfinstitute.org/swfs/revenue-regulation-fund.

Figure 2
Distribution of sovereign wealth funds by continent, as of 18 July 2013



Source: http://www.swfinstitute.org/swfs/revenue-regulation-fund.

* Data on asset holdings are not available for three sovereign wealth funds.

** Data on asset holdings are not available for one sovereign wealth fund.

[3] The Authority manages three funds, namely the Future Generations Fund, the Nigeria Infrastructure Fund and the Stabilization Fund.

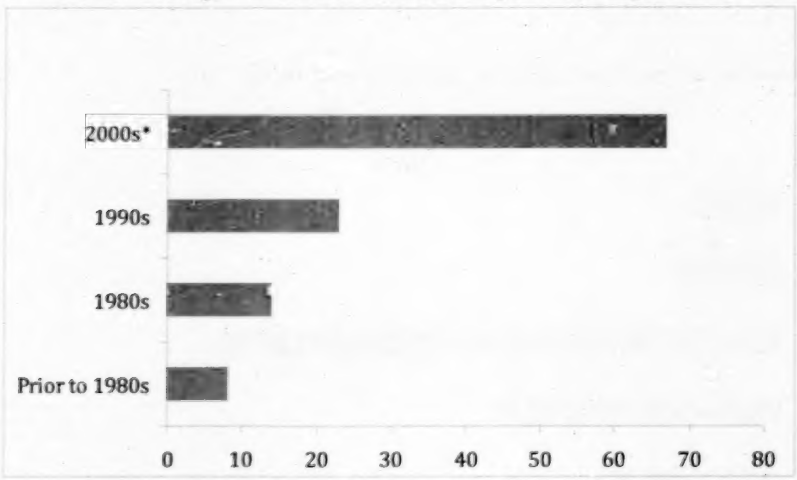
[4] Formerly called the Petroleum Fund.

17. Another positive role of sovereign wealth funds is the accumulation of foreign assets to serve as buffers against price volatility and to help reduce external debt (UNCTAD, 2013a). Sovereign wealth funds may therefore prove useful in the current economic and financial situation. A caveat to this conclusion, however, is that the accumulation of reserves implies opportunity costs that may be higher in some African countries than elsewhere because returns on these assets do not compensate for the foregone potential growth opportunities (UNCTAD, 2002).

18. Empirical studies of the impact of sovereign wealth funds on the economic performance of countries are scarce. Furthermore, the ability of these funds to prevent the Dutch disease or to insulate economies from commodity price volatility is not clearly established in the literature (PricewaterhouseCoopers, 2011). Despite the lack of direct attribution, sovereign wealth funds are found to be correlated with lower inflation, limited exchange rate appreciation and better transparency. Therefore they are believed to be good policy instruments, especially for developing countries with limited absorptive capacity and huge financial inflows from natural resources. More and more of these countries have recently established such funds or are planning to do so, for example, Papua New Guinea, after discoveries of natural gas (Basu et al., 2013).[5] For countries with sufficient absorptive capacity, establishing sovereign wealth funds may be a suboptimal solution, depending on the financial markets. As suggested by Al-Hassan et al. (2013), the country's general macroeconomic context should be carefully examined before deciding on the establishment of sovereign wealth funds.

Figure 3

Number of sovereign wealth funds worldwide by date of inception



Source: http://www.swfinstitute.org/swfs/revenue-regulation-fund.

* Includes data from 2010 to 2012.

19. The main downside of sovereign wealth funds stems from the fact that they may entail either saving financial flows for future generations or investing abroad significant financial flows that are indispensable to meeting the basic needs of the poor in developing countries. Paradoxically, these countries are at the same time those that need to build up their productive capacities to support their developmental efforts, for which the windfall revenues from natural resource exports are crucial. Indeed, productive investments,

[5] See also http://www.swfinstitute.org/swfs/papua-new-guinea-swf/.

including infrastructure, education (technical and vocational) and health, are widely considered prerequisites for economic development (Gylfason, 2001; Morris et al., 2012). These are not only the core elements on which to build and sustain economic development, but they also enlarge commodity-based trade through value addition, local content and economic diversification, which are critical to achieving structural economic transformation. Thus, depending on how sovereign wealth fund assets are managed, they could produce adverse economic impacts by not responding adequately to the problems they have been designed to tackle in the first place.

II. Making the most of natural resources

20. Beyond capturing rents and managing them properly, the host country can make the most of its natural resources by maximizing the capacity of local suppliers to add value to goods and services, or by developing local procurement and mutually beneficial partnerships. It can also do so through local content provisions or requirements. More precisely, in the partnerships area, based on a global value chain analysis, Gibbon (2001) suggested, for example, to have targeted interventions by voluntarily selecting some local enterprises and linking them to top firms in order to allow access to global markets. Although this suggestion could be interpreted as reinforcing dependency on foreign firms, it has the advantage of supporting local firms to benefit from productivity spillovers (Gibbon, 2001). Examples of the different mechanisms for local content promotion or development are discussed below.

A. Commodities and structural transformation: Value addition, local content and economic diversification

21. It has been observed that the natural resources sector is usually isolated, with weak linkages to other sectors. That is why with the recent commodity boom, a number of reports, including those of UNCTAD, recommend the use of windfall revenues to broaden and deepen horizontal and vertical linkages with other sectors of the economy (UNCTAD, 2013a). In the area of natural resources, which is usually dominated by foreign direct investment (FDI), research on linkages has identified four major elements that could increase the importance of backward and forward linkages (Morris et al., 2012). These elements are ownership, infrastructure, capabilities and policy.

22. Firm ownership is an important factor in the development of linkages for at least two reasons:

(a) Locally owned exploiting firms are believed to be better rooted in the host economy than foreign companies. Therefore, they are thought to be more equipped to find out local suppliers and customers to develop backward as well as forward linkages;

(b) Some foreign companies are more likely to develop more linkages than others because of internal pressure such as public opinion on corporate social responsibility as well as strategic vision to support industrial processing zones (Morris et al., 2012; United Nations Industrial Development Organization (UNIDO), 2012).

23. Infrastructure is also important in developing linkages because some infrastructure such as roads and rail transportation could lower transaction costs and therefore boost linkages within the host economy (UNIDO, 2012), as well as enhance possibilities for value addition. The need for infrastructural development is reinforced by the fact that in 2010, only

20.8 per cent of total roads were paved in developing countries, while the world average was 55. 2 per cent.[6]

24. Capabilities and policies matter because there is a need for skilled labour in order to add value. The development of national capabilities is therefore a critical determinant of backward and forward linkages. In particular, a number of weaknesses in capabilities have been identified such as engineering, management and in-house research and development (UNIDO, 2012). To address these weaknesses, an enabling policy environment is required. Such a policy environment is not only supposed to attract FDI but also to catalyse the development of linkages through local capacity development. However, in Africa, it has been noted that policymakers were mostly concerned with attracting FDI rather than encouraging linkages through the development of local firms (UNCTAD, 2005). In response, UNCTAD (2013a) urged commodity-dependent developing countries in particular to diversify their economies through value addition and diversification. Recent research has shown that this is not incompatible with attracting FDI. For example, countries such as Chile have managed to successfully attract FDI while retaining the ownership of the lead national company and providing enabling environment for local firms (Korinek, 2013; Sigam and Garcia, 2012).

25. Several natural-resource-endowed countries have used different mechanisms to develop and deepen linkages to their domestic economies. These include concepts such as the following:

(a) The nurturing of clusters between governments and companies via partnerships and sector linkages in the national economy, for example in South Africa (gold and aluminium sectors) and Mozambique (Mozal aluminium smelter project);

(b) The promotion of inter- and intra-sectoral linkages, interaction, networking and the development of strategic alliances at firm level, the best known examples of which are the industrial linkage programmes and vendor development programmes of Malaysia. The former are aimed at developing domestic small and medium-sized enterprises into competitive manufacturers and suppliers of parts and components and related services to mining TNCs through policies such the granting of pioneer status for TNCs and fiscal incentives such as tax exemptions, among others (UNCTAD, 2011). The objective of vendor development programmes is to stimulate small and medium-sized enterprises as reliable manufacturers and suppliers of industrial parts and components required by TNCs and large industries though the establishment of anchor companies that are willing to participate.

26. In all these policies the role of government is critical, for example, in accelerating the process but clusters can arise spontaneously (UNCTAD, 2011). It is important that government work with the private sector to reinforce and build on established and emerging clusters rather than attempt to create new ones.

27. Among the conditions critical for the success of all these programmes are a stable macroeconomic environment, good infrastructure, skilled manpower and technological capability. It is also important to adopt a multi-stakeholder approach in devising local content strategies and policies that are integrated into the development policies in host countries. Equally important is that such policies should not be in conflict with the commitments that countries have made in the relevant international agreements. There is no one-size-fits-all model on local content; therefore, countries are better off devising the strategies based on their specific conditions. While State-owned extractive companies could play a crucial role in stimulating local participation in the industry, they are not a panacea.

[6] *World Development Indicators*, online database, accessed 24 December 2013.

B. Commodities and local economy: Employment creation

28. In general, the weak linkages of the natural resource sector to the rest of the domestic economy in developing countries have been identified as the major cause of insufficient job creation. Furthermore, some researchers suggest that the ownership of companies exploiting natural resources and their strategies are also crucial determinants of job creation. For example, Chile decided to attract foreign investors while retaining the ownership of its national mining company, Codelco. Bova (2009) argued that this had been a critical element in export revenues by providing diversified sources (national and foreign) of revenues for Chile. In a similar vein, Sigam and Garcia (2012) observed that beyond the average contribution of 13.5 per cent to the national budget during the period 1990–2010, through outsourcing, Codelco had also been instrumental in promoting linkages, generating demand for local service providers and training national professionals. This observation is equally shared by Korinek (2013), who backed this observation with facts. According to him, "in Chile, the proportion of contracted workers with respect to total mining labour force is over 60 per cent". In addition, The country moved from a net importer of mining engineering services between the 1980s and the 1990s to self-reliance in these mining engineering services (Korinek, 2013). This was achieved mainly through the training of Chilean engineers.

29. Three main types of strategies for foreign investors can be distinguished: market-seeking strategies, resource-seeking strategies and efficiency-seeking strategies (UNCTAD, 2006b). The first strategy, market-seeking, aims to reap large profits from local market growth potential. Therefore, it implies that TNCs are integrated in the market system of the host country; by the same token, this integration leads to substantial job creation because of backward and forward linkages (Markusen and Zhang, 1999). The two other strategies, namely resource-seeking and efficiency-seeking investments, are more FDI export-oriented than market-seeking strategies, so they are not expected to boost employment in a sustained manner. The overall effect of FDI on employment is therefore ambiguous.

30. Ownership and other factors such as the objectives of foreign investors and the degree of linkages with the local economy seem important in job creation. Morris et al. (2012) identified the degrees of linkages with the mining sector as key determinants of value addition. This value addition encompasses job creation in the local economy. The first degree of linkages measures the range of inputs needed before and after extraction. This type of linkages is not expected to boost employment in a sustained manner since the needed inputs could be imported with little value addition in the local economy. The second measures the depth of linkages and is associated with more value addition at the local level –it is by far preferable to the breadth of linkages.

C. What role of renewable energies in the future?

31. Natural resources are indispensable ingredients of our modern-day life, and commodities in general contribute to the world economy in a significant way (Weitzman, 1999; Mideksa, 2013). Weitzman (1999) estimates that the depletion of 14 commodities[7] would lead to a loss equivalent to 1 per cent of average consumption each year, that is, a 1 per cent reduction of global GDP. At country level and most recently, Mideksa (2013) suggests that in Norway, since the mid-1970s "about 20 per cent of annual

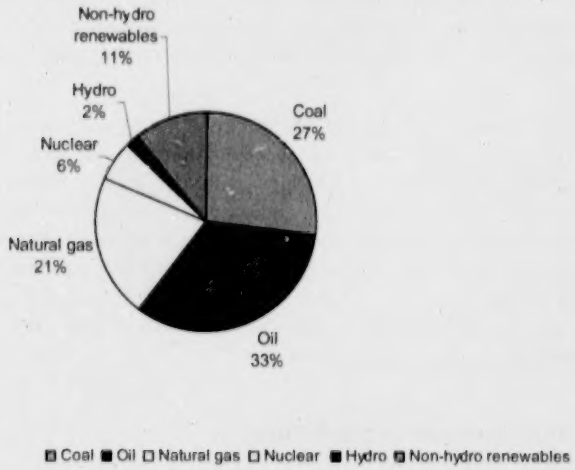
[7] Crude oil, natural gas, hard coal, brown coal, bauxite, copper, iron ore, lead, nickel, phosphate, tin, zinc, gold and silver.

GDP per capita increase is due to the endowment of petroleum resources such as oil, natural gas, natural gas liquids and condensate". However, their extraction and utilization are increasingly associated with pollution, and at least some commodities such as crude oil are forecasted to be exhausted in their current reserves. For example, according to the Organization of the Petroleum Exporting Countries, if crude oil is extracted at its 2011 production rate, reserves will dry up in about 109 years.[8]

32. Against a backdrop of rising pollution and the possible exhaustion of reserves, initiatives are being implemented to seek alternative sources of renewable energy. One of the most prominent and inclusive initiatives is Sustainable Energy for All,[9] led by the United Nations Secretary-General. Its objectives are threefold: first, to ensure universal access to modern energy; second, to double the global rate of improvement in energy efficiency and third, to double the share of renewable energy in the global energy mix. These objectives are based on the progress made so far by many countries, including Brazil and China. Inspiring the initiative is the fact that Brazil in 2009 obtained about 50 per cent of its primary energy supply from renewable sources (UNCTAD, 2013b).[10]

33. Between 2008 and 2011, the renewable energy supply, including hydroelectricity, increased steadily, though its share in the total primary energy supply remained relatively stable – about 13 per cent (see figures 4 and 5). According to the *BP Statistical Review of World Energy 2013*, renewable energy, including hydroelectricity, accounted for 8.2 per cent of the world's primary energy consumption in 2011, before rising to 8.6 per cent in 2012 over the same period.

Figure 4
World energy supply mix, 2008



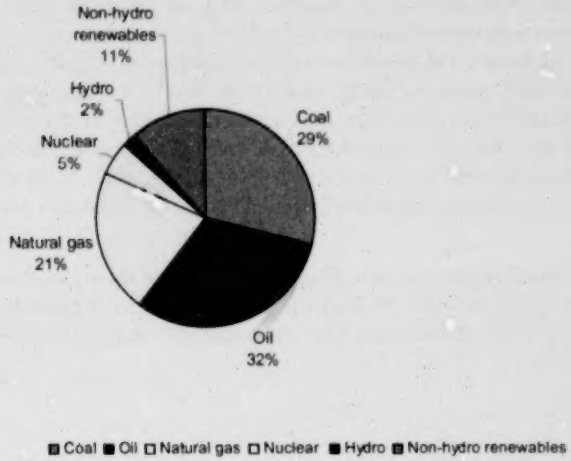
Source: Compiled from data from various editions (2009–2014) of *Key World Energy Statistics*, International Energy Agency (IEA).

[8] See http://www.opec.org/opec_web/en/press_room/180.htm (accessed 15 August 2013) or http://www.opec.org/opec_web/en/press_room/179.htm (accessed 29 September 2013).

[9] See www.sustainableenergyforall.org (accessed 16 August 2013).

[10] This UNCTAD publication also provides a more detailed analysis on renewable energy development in 2012.

Figure 5
World energy supply mix, 2011



Source: Compiled from data from various editions (2009–2014) of *Key World Energy Statistics*, IEA.

34. The world energy supply mix (see figures 4 and 5) could most likely have been different if recent increases in the use of shale gas (especially in the United States in 2012–2013) had been included. Shale gas is an unconventional gas because it is considered more difficult and more costly to produce than conventional natural gas (IEA, 2012). Shale gas production requires techniques such as the injection of strong acids and hydraulic fracturing, which involves pumping a liquid at high pressure into a well and then into the surrounding target rock where the gas remains trapped (IEA, 2012). Because of these unusual and different production techniques, concerns have been expressed about the environmental impacts of shale gas.

35. There is a big divide over the environmental impacts of shale gas. While its production is on the rise in the United States, some European countries such as France and Bulgaria have banned techniques required for its production. Others are still debating the opportunity costs of producing shale gas. Africa is also exploring the costs and benefits of such an undertaking.

III. Concluding remarks

36. The literature is replete with examples of several low-income commodity-dependent economies that have remained poor, or have not made much progress by way of structural transformation, despite their enormous natural resource endowments. Only a handful of these countries, including Malaysia, Indonesia and Brazil, have been able to move from dependence on trade in natural resource exploitation to more diversified economies. In the past decade or so, several other commodity-dependent countries have tried to emulate the examples of these successful cases, sometimes through South–South cooperative arrangements. Strategies such as industrial linkage programmes, vendor development programmes, nurturing of clusters under the general rubric of local content development, and value addition and retention strategies are now commonplace. In other cases, sovereign wealth funds have been set up as means of avoiding the Dutch disease syndrome. However,

as discussed here, these policies or strategies are not panaceas in themselves. Their efficacy depends on initial conditions such as skill levels, technological capabilities, a strong private sector, and above all, an enabling policy environment.

37. As commodity-dependent developing countries seek to ensure a more positive contribution of natural resources to development, the role of energy takes centre stage. As such, these countries would have to pay attention to evolving concerns over the emission of greenhouse gas and associated climate change, and to the need for substituting cleaner energy for fossil fuels. Nonetheless, the share of renewable energies in the total energy supply mix has remained stagnant over the past three to four years, despite efforts in most advanced and some developing countries to increase their share. A variety of policy options have been used to attain this objective, including fiscal and financial incentives and a quota system.

38. The emerging backlash against the use of biofuels because of their perceived impact on food security, however, suggests that policymakers should explore more carefully the link between energy policies and other development goals, in particular social and environmental objectives (UNCTAD, 2010).[11]

[11] For a detailed discussion of these policies, and the implications of renewable energy for energy and food security, see TD/B/C.1/MEM.2/8.

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